

Innovative Solutions to Increase Fibre Intake and Promote Health



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Fibre Recommendations, Intakes, and Definitions

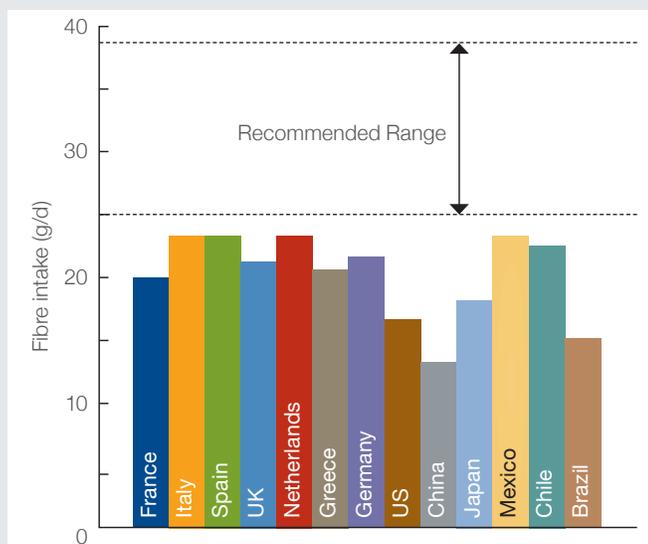
Decades of research point to the health benefits of fibre, including supporting cardiovascular health, tempering spikes in blood sugar, aiding weight management¹, and promoting a healthy gut². Yet across the globe, average intakes are well below the recommended amount despite widespread knowledge of its role in a healthy diet³. With fibre intakes low across global populations, there is potential for long-term public health implications^{1,3}.

Most recommendations for adults call for fibre intakes ranging from 25-38 g/day depending on country-specific guidelines^{2,4}. The World Health Organization suggests recommendations of 25 g/day⁴. Figure 1 notes a wide-range of fibre intakes across various countries against the recommended range for consumption⁴⁻¹⁰. In the United States (US), for most age and gender groups, less than 5% meet the dietary recommendations for fibre¹¹ despite consistent messaging to the public to increase dietary fibre intake. In the United Kingdom (UK), only 13% of women and 28% of men meet dietary fibre recommendations¹⁰.

While traditional sources of fibre like whole grains, fruits, and vegetables should be encouraged, fibres added to foods are also important contributors to dietary fibre intakes. Dietary fibres that are either extracted or synthesized nondigestible carbohydrates and have beneficial physiologic effects in humans are referred to as added or functional fibres². Fibres such as these are useful in developing products that have exceptional taste and appeal to the consumer while offering the same health benefits as fibres that are intact and naturally-occurring in foods. Adding even small amounts of fibre (2.5-5.0 g/serving) to foods traditionally low in dietary fibre could help individuals meet their fibre requirements without exceeding calorie needs¹².

Consumers believe that fibre is important to health and recognize that their diets are lacking¹³, but they still find it challenging to consume the recommended levels. Recent innovations are making it easier for food manufacturers to fortify their products to help boost fibre content and provide health benefits. An abundance of research continues to demonstrate that fibres added to foods provide similar benefits as intact fibres inherent in whole foods.

Figure 1
Adult fibre intakes by country⁴⁻¹⁰





Codex: The international definition of fibre

Several definitions of fibre have been proposed by both scientific and regulatory bodies and most are similar to the definition utilized by the Codex Alimentarius Commission (Codex). Codex has defined dietary fibre as edible carbohydrate polymers which are not hydrolyzed by the endogenous enzymes in the small intestine. These polymers can be naturally-occurring in the food as consumed; obtained from food material by physical, chemical, or enzymatic means; or synthetic carbohydrate polymers. The carbohydrate polymers in the latter two categories have to show a beneficial physiological effect. The polymers may be with ten or more monomeric units or three or more, dependent on national decision. The adoption of the current Codex definition for fibre was finalized in 2009 after many years of international debate¹⁴.

The US Institute of Medicine

In 2002, the US Institute of Medicine² suggested that *Dietary Fibre* consists of nondigestible carbohydrates and lignin that are intrinsic and intact in plants and not digested and absorbed in the human small intestine. *Functional Fibre* consists of isolated or extracted nondigestible carbohydrates that have beneficial physiological effects in humans. *Total Fibre* is the sum of *Dietary Fibre* and *Functional/Added Fibre*.

Examples of *Dietary Fibres* are cereal brans, resistant starch that is naturally-occurring in a food or created during normal processing of a food, some oligosaccharides in legumes, and low molecular weight fructans in foods like Jerusalem artichokes and onions. *Functional Fibres*, also known as added fibres, can be from plant or animal sources and can be isolated, manufactured, or synthetic oligosaccharides with three or more degrees of polymerization. Naturally-occurring poly- or oligosaccharides extracted from their plant source that have been modified also are defined as functional or added fibres. Examples of added or functional fibres found in foods include isolated, non-digestible plant fibres (e.g., pectin and gums), animal fibres (e.g., chitin and chitosan), or commercially-produced fibres such as those from plant sources (e.g., polydextrose and resistant dextrins like soluble corn fibre).

Fibre Innovation Providing Health Benefits

Recent technological advances have allowed the development of new dietary fibres that, when incorporated into foods, result in improved taste and provide an innovative way to help meet fibre intake requirements while staying within calorie limitations. As noted previously, since most individuals are not meeting fibre intake recommendations with the foods they currently eat, adding fibres to foods is a realistic and simple way to address this global public health concern.

One of the primary barriers to increased fibre consumption is potential negative digestive side effects that may be experienced as individuals begin to increase their daily fibre intake. Research on some fibres has shown great promise in overcoming such side effects, enabling people to fill the intake gap. For example, Tate & Lyle's PROMITOR® Soluble Corn Fibre* is well-tolerated as a 40 g single dose and at 65 g/day as multiple doses, and STA-LITE® Polydextrose is well-tolerated as a 50 g single dose or up to 90 g/day¹⁶. Additionally, the majority of studies investigating various health benefits of oat beta-glucan have been completed without reports of gastrointestinal disturbances.



* PROMITOR® Soluble Corn Fibre,
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Science-Based Ingredient Solutions: Soluble Corn Fibre*, Polydextrose, and Beta-Glucan

There is a growing body of research supporting the health benefits of functional or added fibres in the diet, including assisting with weight management, blood glucose control, healthy laxation, overall digestive health, and reduction of blood cholesterol¹⁷. Additional research suggests that certain fibres have prebiotic properties that may support a healthy gut as well as increased calcium absorption and bone health, i.e., Tate & Lyle's PROMITOR® Soluble Corn Fibre*^{18-20,24,28,29}.

Tate & Lyle, a global provider of high-quality, specialty ingredients, helps the food industry meet the growing demand for healthful, functional foods that boost nutrition while addressing dietary shortfalls. Tate & Lyle has developed the following fibre ingredients as well as invested in the research of these fibres to demonstrate their health benefits. These fibres, when added to foods, boost fibre content without sacrificing taste, texture, or enjoyment.

PROMITOR® Soluble Corn Fibre*

PROMITOR® Soluble Corn Fibre* is an innovative fibre ingredient developed by Tate & Lyle that can help increase fibre intake. PROMITOR® Soluble Corn Fibre* has been tested by a number of independent researchers to validate its effectiveness and demonstrate physiological health benefits. The following are some highlights of the research on health benefits:

- Well-tolerated^{15,21-24}, even at high intake levels (40 g/day as a single dose and 65 g/day in multiple doses), and has been found to be better tolerated than inulin¹⁵
- May support bone health by increasing calcium absorption¹⁸⁻²⁰
- May support healthy blood glucose levels by reducing postprandial glycaemic response²⁵⁻²⁷
- Promotes healthy laxation^{23,24} and with fewer negative faecal metabolites²⁴
- Has prebiotic properties^{18,20,24,28,29} which may support a healthy gut by producing short-chain fatty acids (SCFAs) that feed the beneficial bacteria in the gut
- Suitable for increasing fibre and reducing calorie content of foods and may assist with weight management by providing minimal calories (1.2-2.0 kcal/g)^{30,31}

On a food label, PROMITOR® Soluble Corn Fibre* 70 can normally be listed as *soluble corn fibre*, *corn syrup*, or *corn syrup solids*, and PROMITOR® Soluble Corn Fibre* 85 can be listed as *soluble corn fibre* or *maltodextrin*. It is produced through enzymatic hydrolysis of corn starch, is water-soluble and has low viscosity permitting its use in several food, beverage, and condiment applications, including:

- Baked goods
- Candy
- Carbonated beverages
- Cereals
- Dairy products
- Flavoured water
- Frozen foods
- Fruit drinks
- Meal replacement drinks
- Salad dressings
- Soups

STA-LITE® Polydextrose

STA-LITE® Polydextrose is a soluble fibre with a number of demonstrated physiological health benefits based on research. The following are some highlights of the research on health benefits:

- Well-tolerated^{16,23,24,32-34}, even up to 90 g/day or 50 g as a single dose¹⁶
- Supports healthy blood glucose management by reducing postprandial blood glucose response^{33,35-38}
- May assist in regularity as a result of its faecal bulking effect^{23,24,33,39-41}
- May support the growth of beneficial gut bacteria^{33,42-44}
- May support a healthy gut by producing SCFAs, which feed the beneficial bacteria in the colon^{24,33,45}
- Ideal for reduced-calorie foods and may assist with weight control by providing negligible calories (1 kcal/g)^{32,46,47} and a satiety benefit, as suggested by emerging data^{26,48,49}

STA-LITE® Polydextrose can be found in:

- Cakes, cookies, and pies
- Cereals and snacks
- Fruit spreads
- Hard and soft candy as well as chocolate
- Ice cream and other frozen desserts
- Peanut spreads
- Powdered drinks
- Reduced-sugar, -fat, and -calorie foods
- Salad dressings
- Sauces, syrups, and toppings
- Soft drinks

* PROMITOR® Soluble Corn Fibre, PROMITOR® Soluble Gluco Fibre in Europe



PromOat® Beta Glucan

PromOat® Beta Glucan is a viscous soluble fibre made by Tate & Lyle to help promote health and increase dietary fibre intake. Oat beta-glucan has been tested by a number of independent researchers to demonstrate its physiological health benefits. The following are some highlights of the research on the health benefits of oat beta-glucan:

- Promotes heart health by lowering blood cholesterol levels⁵⁰⁻⁵⁴
- Supports healthy blood glucose levels by eliciting a lower glycaemic response⁵⁵⁻⁵⁷
- Well-tolerated and may support a healthy gut by producing SCFAs⁵⁸⁻⁶⁰
- May assist with weight management through calorie and fat reduction in foods and promotion of satiety⁶¹⁻⁶³

PromOat® Beta Glucan is concentrated beta-glucan derived from non-genetically modified, Swedish oats, produced by a chemical-free, aqueous, enzymatic process. This product is acid- and heat-stable, which allows for easy integration into many food and beverage products, including:

- Baked goods
- Cereals
- Dips
- Fruit juices
- Sauces and salad dressings
- Smoothies
- Sports drinks
- Soups

Conclusions

Consumers tend to fall short on servings from the food groups that contain fibre – including in particular, fruits, vegetables, and whole grains. While individuals should increase their consumption of these foods, the incorporation of added fibres into foods as part of a well-balanced diet can help individuals meet their recommended fibre intakes without exceeding their calorie needs. Tate & Lyle's PROMITOR® Soluble Corn Fibre*, STA-LITE® Polydextrose, and PromOat® Beta Glucan are uniquely positioned to be ingredients that food manufacturers can use in the development of new and innovative products to meet the population's fibre needs and confer a variety of health benefits.

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A commitment to innovation

Tate & Lyle, a global leader in wellness innovation, is committed to delivering innovative ingredients that can be incorporated into great-tasting foods to help consumers meet their nutrition, health, and wellness needs every day. That is because Tate & Lyle invests heavily in innovation and research and in developing ingredients that can be incorporated into a wide variety of great-tasting food and beverage solutions. Teams of food and nutrition scientists are continuously innovating, researching, and testing ingredients that will meet current and future health and nutrition needs.

At the same time, Tate & Lyle has a robust market research program designed to provide the necessary insights on consumer preferences around the world. The research program allows Tate & Lyle to customize its offerings and provide tailor-made solutions in local and regional markets.

Better-for-you ingredients for health and wellness

In response to global public health efforts calling for people to reduce calories and sodium and increase fibre intakes, Tate & Lyle offers a number of novel ingredient solutions that meet these needs.

To learn more about Tate & Lyle ingredients and innovation as well as health benefits and relevant research, please visit www.foodnutritionknowledge.info and www.tateandlyle.com.



Tate & Lyle's global Commercial and Food Innovation Center, Hoffman Estates, Illinois, USA

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